

# CHANGE MANAGER for DB2\*

## New Solutions for DB2 Change Management

### *Power and flexibility*

The hotly competitive, ever-changing environment of business today dictated the need for a DBMS with the power and flexibility to meet the information processing demands of a dynamic organization. DB2 has won wide acceptance by fulfilling these requirements. However, the benefits of DB2's flexibility are somewhat undermined by its size and complexity.

Most organizations that have implemented DB2 rely on multiple DB2 subsystems to facilitate the design, development, test and production stages of an application's life cycle. The data independence offered by DB2 allows the application data structures in each of these subsystems to vary for any given application. These variations in structural elements are required to satisfy issues regarding performance, security and additional uses of data from one subsystem to another. Applications may also exist at different version levels on different subsystems. All of these factors make the task of database administration much more complex and error-prone than with previous DBMS systems, such as IMS.

### *Time for a change*

Studies show that approximately 70% of the application life cycle is devoted to maintenance. These mod-

ifications to the application will likely have an impact on the DB2 data structures that support the application. Implementing changes to data structures managed by DB2 in today's complex environment can be a challenge for even the most experienced DBA. Trends such as:

- increasing numbers of DB2 applications
- more mission-critical applications
- continuous availability
- increasingly complex data structures
- distributed DB2 environments
- proliferation of CASE tools

are adding to the issues that must be considered by a DBA to accomplish even the smallest application change. The strengths of DB2--data independence and flexibility--frustrate efforts to make implementing changes to DB2 structures a manageable process. The challenge faced by DB2 DBAs is to maximize the power of DB2's capabilities while keeping control of data structures and facilitating the responsive implementation of changes.

### *Solve DBA problems*

BMC Software has been solving the problems associated with DB2 database administration since its introduction of ALTER™ for DB2\* in 1987, which pioneered the automa-

tion of the change process for DB2. ALTER's milestone technology has become the standard against which similar tools are now measured. ALTER satisfies the requirements for implementing changes within a single DB2 subsystem and also provides the ability to migrate DB2 structures and data to different DB2 subsystems. However, the technology embodied in ALTER, as well as in other similar products, does not address the complete set of requirements for managing change within a complex DB2 environment comprising multiple subsystems as well as CASE tools and various other repositories for structure definitions.

In such complex DB2 environments, changes must be implemented while structure modifications that have been made locally for tuning, data access or security purposes are preserved. CASE tools and other repositories used for application design must be synchronized with DB2's implementation of data structures.

BMC Software has continued to listen to DBAs to determine the requirements for a complete, comprehensive solution to the problem of change management for DB2. Input from current ALTER users and other experienced DBAs has been refined to form a concise set of requirements for managing changes to DB2 application data structures.

# BMC SOFTWARE

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## ***DB2 change management***

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An automated solution to the problem of managing changes to DB2 structures should meet the following requirements:

- Change Implementation
- Structure Migration
- Change Migration
- Change Feedback
- Change Recovery
- Change Audit

**Change Implementation** should provide a process to change the definition of any DB2 object while preserving or converting data, preserving dependent structures and propagating changes to dependent structures.

**Structure Migration** should generate CREATE SQL DDL commands from the sending subsystem and apply those CREATE SQL DDL commands at the receiving subsystem allowing modifications to take place at the receiver. It also must be possible to move data from the sender to the receiver.

**Change Migration** should provide the ability to identify changes made at the sending or control subsystem since the last version was sent to the receiver. These changes need to be analyzed for feasibility at the receiving subsystem and the changes must be applied while preserving or converting data, preserving dependent structures, propagating changes to dependent structures and preserving local modifications to structures.

**Change Feedback** should provide a mechanism to identify and capture local changes that have been made to structures that need to be reflected in the control subsystem. These changes then need to be applied at the control subsystem while satisfying all of the requirements for Change Migration.

**Change Recovery** should provide a method of capturing structure definitions and data that can be

used to fall back to a previous version of the structure in the event of an unsuccessful change. The fall-back process must allow current data to be converted to the old structure as well as the ability to use the captured version of the old data.

**Change Audit** should provide the ability to capture structure definitions at different points in time. From these captured definitions it must be possible to determine when and by whom all structure changes have been made during a given period of time.

ALTER satisfies the first two requirements, Change Implementation and Structure Migration. BMC Software is building upon the foundation of this technology to provide a complete and comprehensive solution for the four remaining requirements. **CHANGE MANAGER** for DB2\* is BMC's answer for DB2 DBAs who need a tool to ease the complex, time-consuming, error-prone task of managing changes to DB2 data structures.

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## ***BMC's solution***

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CHANGE MANAGER will provide the ability to migrate and implement changes to DB2 structures instead of recreating the entire structure. This preserves any local modifications that may have been implemented on the receiving DB2 subsystem. Changes, called Change Specifications, are derived by analyzing versions of application structures captured by CHANGE MANAGER or structures defined by other means, such as SQL DDL statements, CASE tools or the DB2 catalog. These are then transmitted to the receiving DB2 subsystem where CHANGE MANAGER will ensure proper implementation.

CHANGE MANAGER will provide change feedback by generating Change Specifications for local modifications that can be transmitted back to the controlling DB2 subsystem. The Change Specifications are implement-

ed by CHANGE MANAGER at the controlling DB2 subsystem, synchronizing the data structure definitions.

Sites that use the Bachman Information Technology, Inc. CASE product DB2/DBA as their control point for structure definitions will have the advantage of sharing Change Specifications between CHANGE MANAGER and the BACHMAN tool. BMC and BACHMAN have agreed to jointly develop an interface that will allow the same Change Specifications to be processed by both tools. This allows BACHMAN's DB2/DBA repository to migrate changes to DB2 subsystems and allows CHANGE MANAGER to feed-back local changes to the BACHMAN repository to keep the DB2 structure implementation in sync with the BACHMAN DB2/DBA repository.

Additionally, CHANGE MANAGER will provide a method to capture structure definitions and data at any application version level. These captured versions may be used to recover from an application change that is unsuccessful. Recovery can be achieved either with current data that will be converted to the old structure or with old data that was captured by CHANGE MANAGER. BMC's high-speed DB2 utilities UNLOAD PLUS and LOADPLUS™ are used to efficiently unload, load and convert the data.

Finally, CHANGE MANAGER will allow captured versions of DB2 structures to be analyzed to determine the changes that have been made during the interval of time between the two versions. This will provide DBAs with an accurate record of DB2 change activity without regard to the mechanism used to accomplish the change.

BMC Software's CHANGE MANAGER represents a breakthrough in the technology available to administer DB2. With it, it will be possible to safely respond to DB2 application changes in a timely manner, capitalizing on the power and flexibility of DB2.



# CHANGE MANAGER for DB2\*

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In this book,  
**IBM**  
is giving you some information  
about the  
**BACHMAN<sup>®</sup>**  
DB2<sup>®</sup> Product Set

Why?

Because...



...BACHMAN can help you exploit the power of DB2 and realize the promise of AD/Cycle — without losing your investment in existing systems.

## BACHMAN and DB2

As the DB2 manual says, DB2 offers flexibility and power. That's why MIS shops are looking to it as the solution to their database problems. But the ability to build and maintain a good database design isn't shipped with DB2. It has to be learned. The best DBAs know that the DB2 Optimizer makes their job easier and harder, because they must understand its behavior to create DB2 designs that perform.

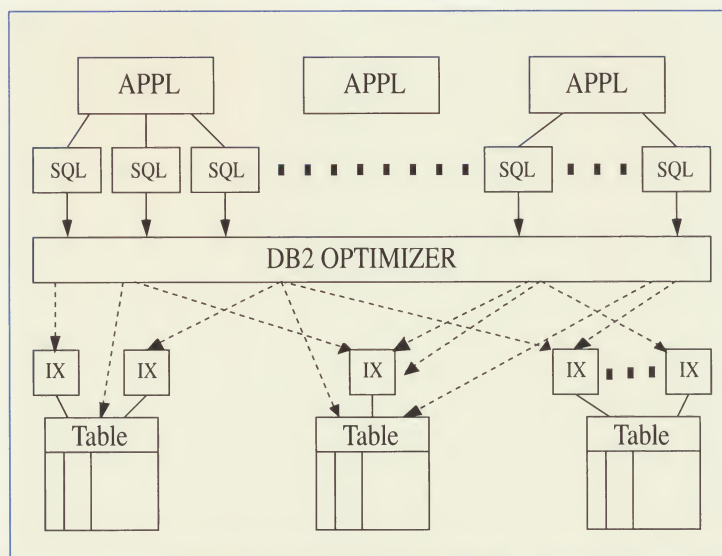
Experienced DBAs are in short supply. With IBM actively extending DB2 it can be hard to keep up. Hard to know which rules of thumb are still useful. Hard to look at all the details in a complex design. Hard, if you're new to database design, to know where to start.

The problem is compounded by the pressure to build new DB2 applications and at the same time to migrate — from flat

files, from IMS, or from other database systems such as IDMS. From "designs" that might be decades old, to new, optimal relational DB2 designs. And the database designs you build today need to serve past, present, and future applications.

**BACHMAN**  
can help you  
with these  
challenges.

*The DBA must provide the optimizer with a design that can be used effectively with any SQL.*

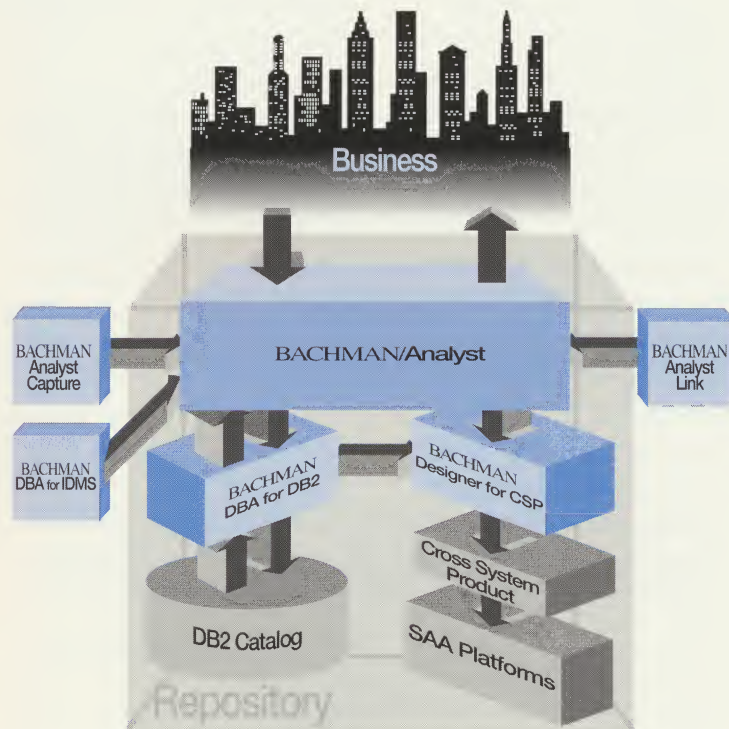


# The BACHMAN solution for relational applications

Enter BACHMAN, the model-driven development company that incorporates re-engineering technology. Based on a re-conception of the software development life cycle, BACHMAN products address the needs of DB2 data administrators, database administrators and analysts who create new DB2 applications and enhance existing ones.

The solution is to take advantage of the investment you've made in existing database designs, and build and exploit data models and specifications, extending their useful life beyond a system's first day in production. To BACHMAN these are two facets of the same challenge — creating systems that can change to meet your business needs, and change to take advantage of developing technology.

Your business grows and changes. BACHMAN re-engineering is growth and change ... without chaos.



# The BACHMAN difference

Unlike other CASE products, BACHMAN encourages you to leverage your investment in existing databases and build new data, process, and logic models that enable you to quickly generate code through IBM's Cross Systems Product (CSP).

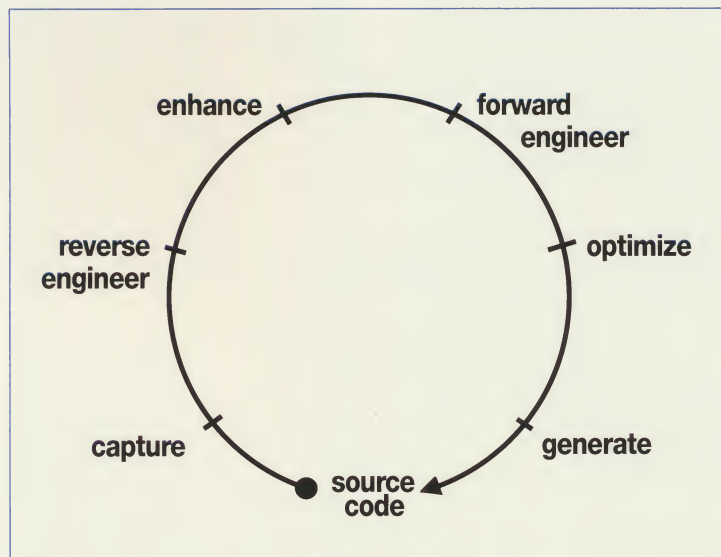
But your business requirements are not all new systems. BACHMAN can help you migrate older designs, create optimal information models at the Entity-Relationship level, and then design the best possible DB2 structures for those entities. At the touch of a mouse, you generate new or changed SQL data definition language (DDL) for your design.

## It's not magic, it's re-engineering

Technically, re-engineering is reverse engineering, modification, forward engineering, and code generation.

Reverse engineering takes a physical design, obtained by extracting data structures from existing systems in DB2, IMS, IDMS, or flat files, and translates it into a data model, which is presented as entities and relationships.

Forward engineering translates a high-level model or specification into a physical design, automating the process of developing a new system or database. This in turn allows you to optimize the implementation specification, and generate syntactically correct code. BACHMAN even ensures that your generated SQL is consistent with the DB2 catalog.





# Powerful solutions, but easy to use

In the BACHMAN/Data-  
base Administrator for DB2, you  
use icons, menus, and forms to  
edit a database design. Diagrams  
focus on either relational or  
physical aspects. This compre-  
hensive editing facility lets you  
see a table on the screen, quickly  
open a form full of detailed infor-  
mation, and then look at related  
information such as the indexes  
or views on that table. You can  
create, modify, or delete any type  
of object.

## More than pretty pictures

BACHMAN E-R and  
DB2 diagrams show a graphical  
summary of your model, allow-  
ing you to communicate with  
other groups in your organiza-  
tion. But the detail behind the  
model makes the difference be-  
tween a pretty picture and an  
asset to the enterprise.

Consider the CUSTOMER  
entity in the BACHMAN/  
Analyst. Behind a CUSTOMER  
entity there may be reusable  
process specifications for

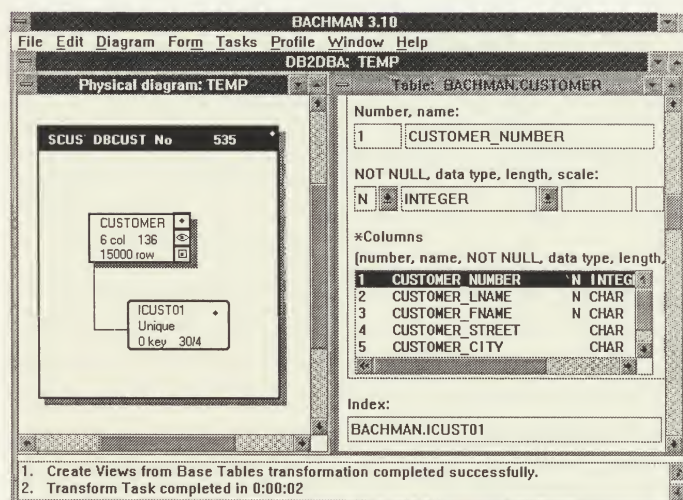
creating or deleting a customer.  
There are estimates of how  
many customers you expect to  
have in the system over time. Of  
course, there are the attributes  
— the pieces of information that  
make up a CUSTOMER in your  
system. And the attributes  
contain definitions of their data  
types, lengths, and even allowed  
values. There is a pointer (map)  
to the physical DB2 table or  
tables that represent this entity  
in the production system.

In the DB2 design you  
can see the pieces of information  
that make up this table's defini-

tion: columns, keys, indexes,  
views on this table, and storage  
characteristics of the table space  
(segmented? partitioned?).

And you enter informa-  
tion that describes your use of  
the data. Are there a small num-  
ber of customers that dominate  
your business?

Each piece of information  
is a part of your business re-  
quirements. Together, they are  
your business. BACHMAN uses  
this information to help you de-  
fine the best system for your  
business.

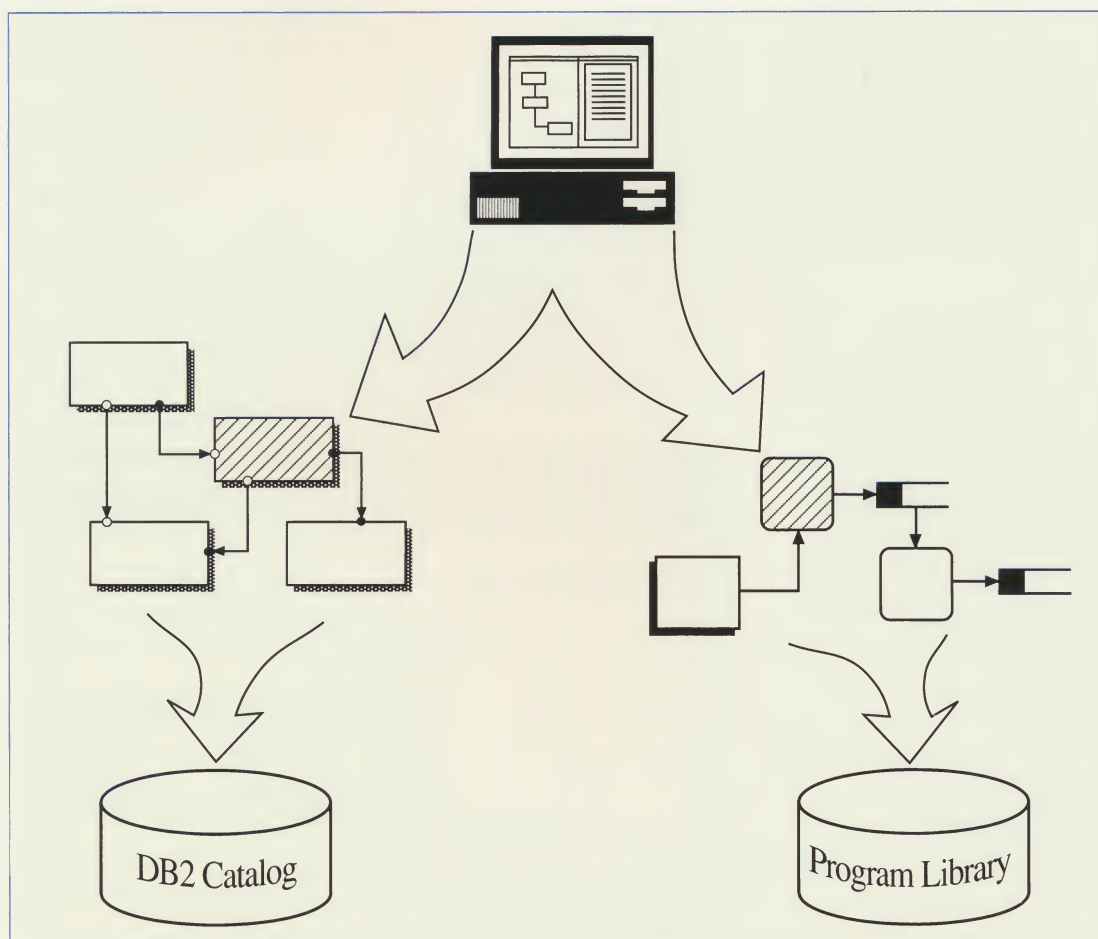


# “But the business changes...”

The BACHMAN model of your business can change too, with the click of a mouse. That's the appropriate place to reflect a business change. Because the BACHMAN model is the applica-

tion and BACHMAN maintains the relationships among all the pieces, you can automatically propagate the changes into modified production DB2 databases and CSP executable code

or CSP generated COBOL. Despite the simplicity, the resulting system is optimized and production quality.





# Expert assistance

The BACHMAN/Data-base Administrator for DB2 lets you build a design quickly, but it also helps you build a good design.

As you modify your design, the system provides flexibility, letting you sketch out tables now and fill in columns later...letting you change that table name, and later go back and fix the views that depend on that table. But with the system's help you can find these holes at any time and fix them before you generate DDL.

The BACHMAN/DBA for DB2 helps you produce a high-performance design, helping you allocate free space, order columns for multicolumn indexes, decide between fixed and variable definition and, where applicable, denormalize the data.

The BACHMAN/DBA for DB2 also helps you solve problems. For instance, how much free space should you allocate to accommodate data that grows by 75% each year...?

If you guessed 75%, you've wasted more than 32%

of your disk space, added 50% to your sequential I/O, and let yourself in for some sleepless nights.

With BACHMAN? Press a button to find the answer. (It is 42%.)

Now, should it be imbedded free space or at the end of the table? BACHMAN will tell you that, too!

BACHMAN incorporates the knowledge of its DB2 experts into an Expert Advisor. You can let the system make decisions, and review a system journal to check its work, or you can run interactively. How much of the system's expertise you use is up to you. BACHMAN supplies the advice — you supply your own understanding of the system requirements. The final decision is yours.

The BACHMAN/DBA for DB2 doesn't get tired or bored, either. It doesn't mind looking at thousands of objects for potential design problems. And it will only call your attention to those that are potential problems.

## Build your DB2 skills

You don't just learn to use the BACHMAN/DBA for DB2, you learn from it. The system's messages, diagrams, and Help facility transfer the embedded knowledge of DB2 to newer DBAs, allowing them to learn as they work. Experienced DBAs are free to tackle the knotty problems, doing what they do best.

And the BACHMAN/DBA for DB2 is still learning. It gets smarter in each release.

# The BACHMAN/Analyst

The BACHMAN/Analyst lets you use the same quality graphics and windows to build an enterprise model that consists of a data model: entities and relationships, process models: detailed specifications of processing against the data, and logic models: procedural business specifications that reference the data model.

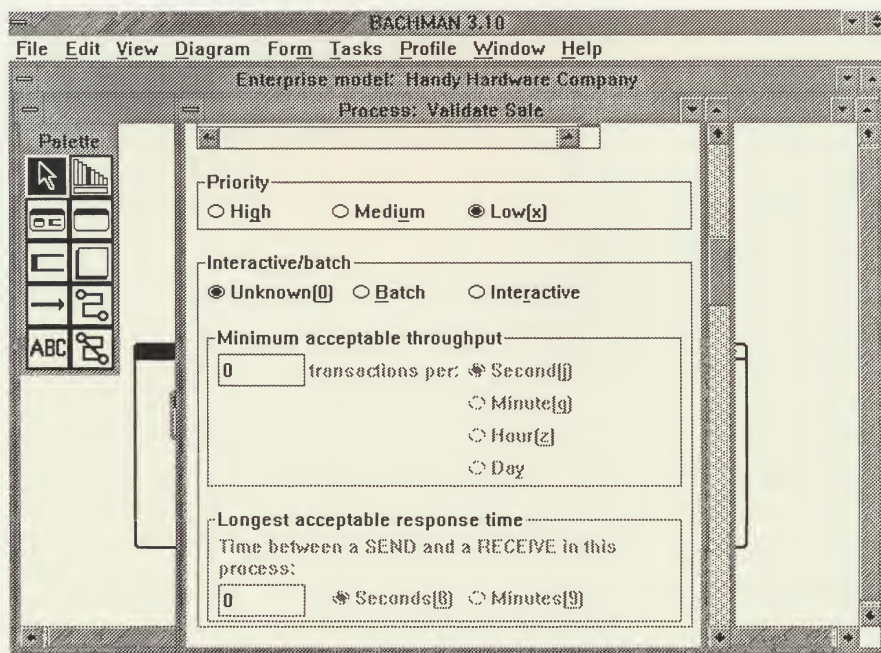
We've said that through forward engineering the

BACHMAN/Analyst provides the entities and relationships that make up the tables and columns in your DB2 design. The Analyst advantage goes further than that, it tracks what your processes are doing with the data.

For each process, the BACHMAN/Analyst records performance requirements that can be used to create a high-performance database design.

You can highlight the processing that occurs against each piece of data, and optimize your design before it reaches production.

Process and logic specifications are implementation-independent. When technology changes, and it will, the designs you create today live on in the new systems. Forward engineering takes care of the implementation details.





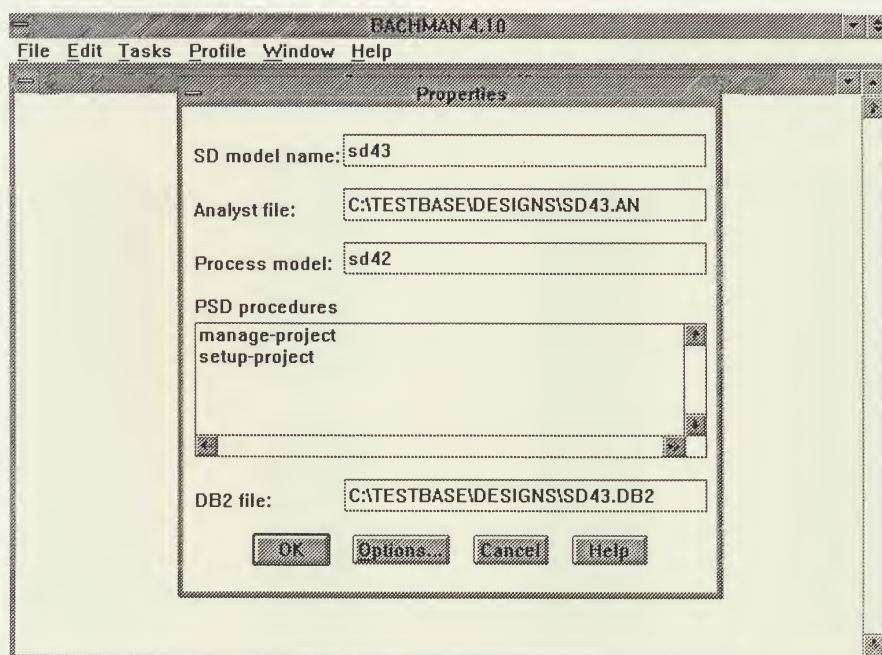
# The BACHMAN/Designer for CSP

The BACHMAN/Analyst and the BACHMAN/Database Administrator for DB2 are joined by the BACHMAN/Designer for CSP. This product transforms business logic specifications to CSP in IBM's SAA External Source Format (ESF). Entity level data requests are translated

into SQL statements that use the tables in your BACHMAN DB2 design. All this can be imported into CSP/AD, and used to generate CSP/AE execution modules or COBOL code. This integrated BACHMAN/IBM solution takes you quickly from conceptual models to optimized production

DB2 CSP or COBOL code.

Data structures change? New CSP capabilities? No problem. Run the same model back through the BACHMAN/Designer for CSP for updated SQL and program logic.



# Flexibility to fit any methodology

Your organization already has methods for creating new systems and modifying old ones. BACHMAN supports that methodology, providing tools to make your work easier. It is flexible enough to help you build a good design following any path you choose.

## The story doesn't end

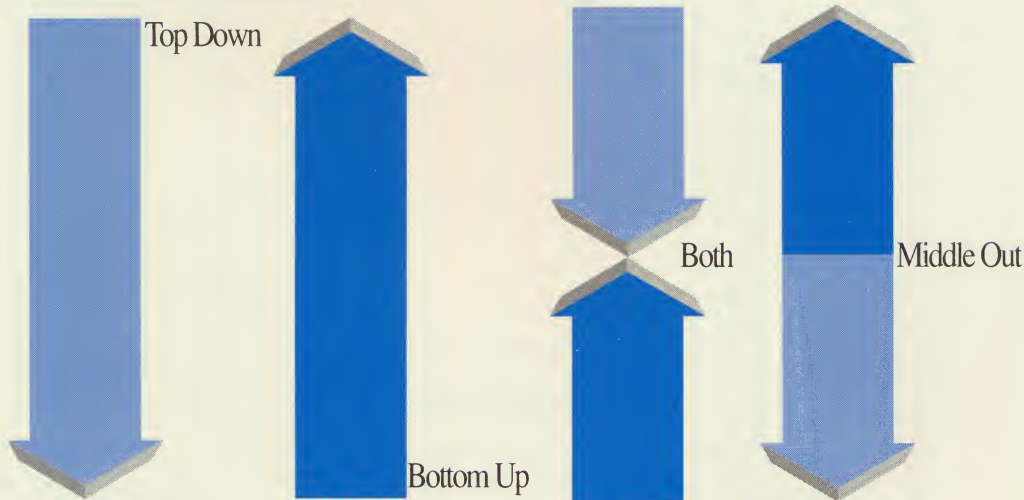
Other CASE products might help get your application into production, but BACHMAN protects your investment by re-

taining the entities, relationships, tables, specifications, and mappings between them. You can respond to changes in business requirements, make the change at the appropriate level, and then propagate the change into the production system. You've built a living model of your business that you can use to build new systems at a fraction of the cost, and communicate with every work group.


## A strategic investment

When you choose to take advantage of other AD/Cycle components such as IBM's Repository, BACHMAN products can help. As an AD/Cycle Business Partner, BACHMAN is helping IBM design the models at the heart of the Repository. BACHMAN will implement AD/Cycle solutions that allow you to use Repository along with the BACHMAN/Analyst and BACHMAN/DBA for DB2.

*BACHMAN supports your methodology.*







# BACHMAN and DB2 — An Unbeatable Combination

The BACHMAN/Data-  
base Administrator for DB2,  
combined with the BACHMAN/  
Analyst, BACHMAN/Designer  
for CSP, and related products,  
can help you use DB2 as it was  
meant to be used, while  
exploiting enterprise modeling,  
promoting a model-driven ap-  
proach to application develop-  
ment, and fulfilling the promise  
of AD/Cycle.

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about BACHMAN in this book?


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\_\_\_\_\_

My IBM MR/SE is:

\_\_\_\_\_

Name \_\_\_\_\_

Title \_\_\_\_\_

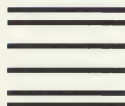
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# BACHMAN

*For more than software. For business.*







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